

Sweep Plug-In
P-130-E

KAY ELECTRIC CO.

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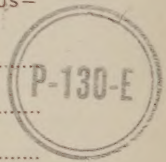
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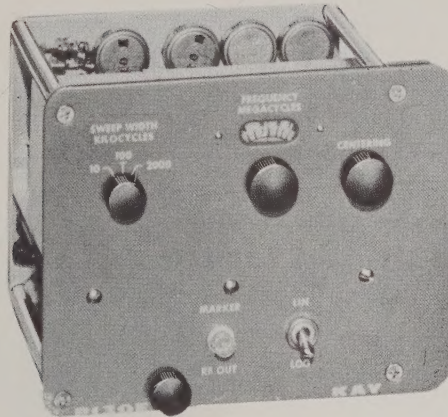
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TEAR OFF AT THIS LINE

**SWEEPING OSCILLATOR****PLUG-IN UNIT****MODEL P-130E****POLICY COVERING REPRODUCTION AND USE OF TECHNICAL DATA**

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SECTION 1, GENERAL INFORMATION

1-1 INTRODUCTION.

The Model P-130E sweep plug-in is compatible with Kay sweeping oscillator units, such as, the Marka-Sweep Model Pi and Vari-Sweep 860-E. The P-130E sweep head is a beat frequency oscillator which provides clean, stable sweeps from 100 cps to 2 mc. Excellent wide sweeps to cover tape recorder application and stable, narrow sweeps for filter alignment are provided.

Three switched sweep width ranges are available providing optimum stability at the required sweep. These are continuously variable to 10 kc, 100 kc and 2 mc. Any portion of the 100 cps to 2 mc range can be swept in a centered sweep, and sweep width can be either linear or logarithmic at all rep rates.

Oscillator output is adjustable to 1 volt rms into 70 ohms (50 ohms, if ordered). Center frequency is indicated on an illuminated dial calibrated from 0 to 2 mc.

A separate Marker RF Out jack provides a means of coupling out a tapped-down swept r-f voltage to drive a marker generator plug-in, such as Kay PM-7631A or PM-7632A. (These marker plug-in heads are compatible with Kay Model Pi sweeping oscillator and marker generator basic rack unit.) When the P-130E sweep head is used in the Kay Vari-Sweep Model 860-E sweeping oscillator rack unit, the swept r-f voltage may be coupled to an external frequency marker generator, such as the Kay Vari-Marker Model F, which provides up to 40 crystal-controlled, pulse-type frequency markers.

Internal marker pips, which appear as negative notches on the detected sweep envelope, may be developed when the P-130E sweep head is used in conjunction with the PM-7631A or PM-7632A marker heads. This type of marker is useful for marking video tape, and for transmission of marker data over long-line cables.

Power for the P-130E sweep head and all driving signals are furnished by the basic rack unit.

1-2 SHIPPING DAMAGE.

As soon as the Model P-130E Sweeping Oscillator Plug-in is received, it should be visually inspected to determine that it was not damaged during shipment. A careful check of packing case contents should be made to insure removal of all items shipped. Shortage or damage should be reported immediately to the Carrier and Kay Electric Company, or its representative in the area.

Equipment Supplied. The Model P-130E is shipped completely assembled and ready for installation in a compatible basic rack unit. Other auxiliary equipment and interconnecting cables referenced in these instructions are not furnished.

1-3 SPECIFICATIONS.

Frequency Range: 100 cps to 2 mc.

Output: 1 volt rms into 70 ohms (50 ohms, if ordered).

Flatness: ± 0.5 db over widest sweep.

Sweep Width: 3 switched ranges variable to 10 kc, 100 kc, or 2 mc; continuously variable within each range. Either linear or logarithmic sweeps at all repetition rates and sweep widths.

Power Input: All power and driving signals are furnished by the basic rack unit.

Dimensions: 6"h x 7 $\frac{1}{2}$ "w x 10"d

Weight: 6 lbs.

SECTION II, OPERATION

2-1 INTRODUCTION.

General operating instructions are furnished in the instruction manual provided with the basic rack unit(s) in which this sweep plug-in head may be used. Specific identification and function of only those controls and terminals physically located on the plug-in head are discussed here. Since these controls and terminals have a direct relationship to those on the basic rack, both manuals should be referred to.

Installation of P-130E sweep plug-in in the rack unit is accomplished by pushing the plug-in into the receiving well as far as it will go. To lock the plug-in in place, turn the locking screw clockwise until it is tight. The plug-in may be removed from the rack unit by turning the locking screw counterclockwise to release it from the rack, and pulling the plug-in free.

2-2 CONTROLS AND TERMINALS (Front Panel).

CONTROL	POSITION	FUNCTION
SWEEP WIDTH KILOCYCLES Switch S-1	10 kc 100 kc 2 mc	Permits selection of sweep ranges or widths. The Sweep Width control on the rack unit adjusts sweep width within the ranges.
LIN-LOG Switch S-2	LIN LOG	Depending on the position of this switch, either linear or logarithmic sweeps will be generated.
FREQUENCY MEGACYCLES Capacitor C-4	Variable	Calibrated in frequency from 0 to 2 mc and indicates center frequency.
CENTERING Capacitor C-6	Variable	Used to make small center frequency adjustments to calibrate Frequency Megacycles dial.

TERMINAL	FUNCTION
MARKER RF OUT Jack J-1	A portion of swept r-f output is available here, and is normally patched to Marker RF IN jack on Marker Plug-in unit.

2-3 INTERNAL CONTROLS AND TERMINALS.

CONTROL	POSITION	FUNCTION
LIN ADJ Pot. R-43	Variable	Used to establish conduction point of diode D-5, and thus the shape of sawtooth voltage fed to voltage-variable capacitors C-44 and C-45.
DC BAL Pot. R-44	Variable	Used to establish bias for voltage-variable capacitors C-44 and C-45.
METER ADJ R-62	Variable	Used to calibrate output meter on basic rack unit at 1 volt rms.
OUTPUT ADJ R-61	Variable	Used to set the maximum r-f output voltage to 1 volt rms.

TERMINAL	FUNCTION
RF OUT Jack J-2	Swept rf is available here, and is patched to input connector on step attenuator in basic rack unit.

2-4 OPERATION.

The P-130E sweep plug-in should be installed in its receptacle in the basic rack, and connections provided between the associated equipment as described in the instruction manual furnished with the basic rack unit. For most applications, the interconnections illustrated in the instruction manuals furnished with the rack units will be correct. (Fig. 1-1, Marka-Sweep Model Pi; Fig. 2-1, Vari-Sweep 860-E manual).

General operating instructions.

- Set the Lin-Log switch to the desired mode.
- Set Sweep Width Kilocycles switch to desired range.
- Adjust the Frequency Megacycles control to the desired center frequency.
- Assuming that panel controls on the basic rack unit are appropriately set, a pattern should appear on the CRO screen. (Normally, the faster repetition rates are used with wide sweep widths, and slow rates for narrow widths and logarithmic sweeps.)
- The Centering control acts as a fine tuning control for small adjustments of center frequency.
- The RF Level control and attenuator on the basic rack unit may be used to control the amplitude of the output signal.

SECTION III, CIRCUIT DESCRIPTION

3-1 OVER-ALL CIRCUIT DESCRIPTION.

The major circuits of the P-130E sweep head consist of a c-w oscillator, sweep oscillator, balanced modulator, low-pass filter, and output amplifier. The relationship of these circuits is shown in Fig. 3-1.

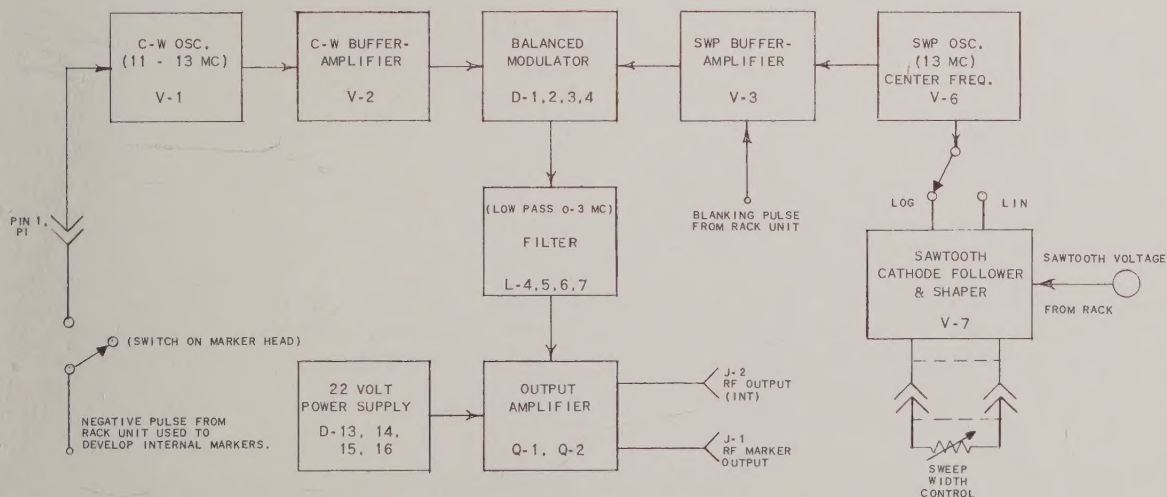


Fig. 3-1 Simplified block diagram shows relationship of major circuits, Model P-130E sweep plug-in.

A sawtooth voltage, generated in the rack unit, is applied to sawtooth shaper and cathode follower V-7, which develops either a linear or logarithmic voltage change, according to the setting of the Log-Lin switch, S-2. The resultant output voltage is applied to voltage-variable capacitors C-44, C-45 in the plate circuit of sweeping oscillator V-6. The varying voltage developed across C-44, C-45 varies (sweeps) the output frequency of V-6 within the limits established by the Sweep Width Kilocycles switch, S-1.

Zener diodes D-5, 6, and 12 compensate for the nonlinear characteristics of the voltage-variable capacitors. Tunable inductors L-2, and 3 are the tank coils for the narrow and wide sweep width modes, respectively. Transformer T-4 couples the output from V-6 to sweep buffer-amplifier V-3, and also couples the negative blanking pulse which turns V-3 off during CRO retrace time.

C-W oscillator V-1 operates in the 11 to 13 mc range, and is tunable by C-4 and C-6, the Frequency Megacycles control and Centering control, respectively. Output is coupled through T-1 to c-w buffer-amplifier V-2. (A negative pulse may be developed across diode D-18, when the P-130E head is used in the Model Pi rack unit, notching oscillator output to produce internal markers.) Diode D-17 in the plate circuit of V-2 is the output meter detector.

The signals from V-2 and V-3 are applied to a balanced modulator incorporating diodes D-1 through D-4 where both sum and difference frequencies are generated. Modulator output is taken from the center tap of T-2 and fed to a low-pass filter (L-4 through L-6). Only the difference frequencies are passed by the filter (Fig. 3-2) and applied to the two-stage output amplifier composed of transistors Q-1 and Q-2.

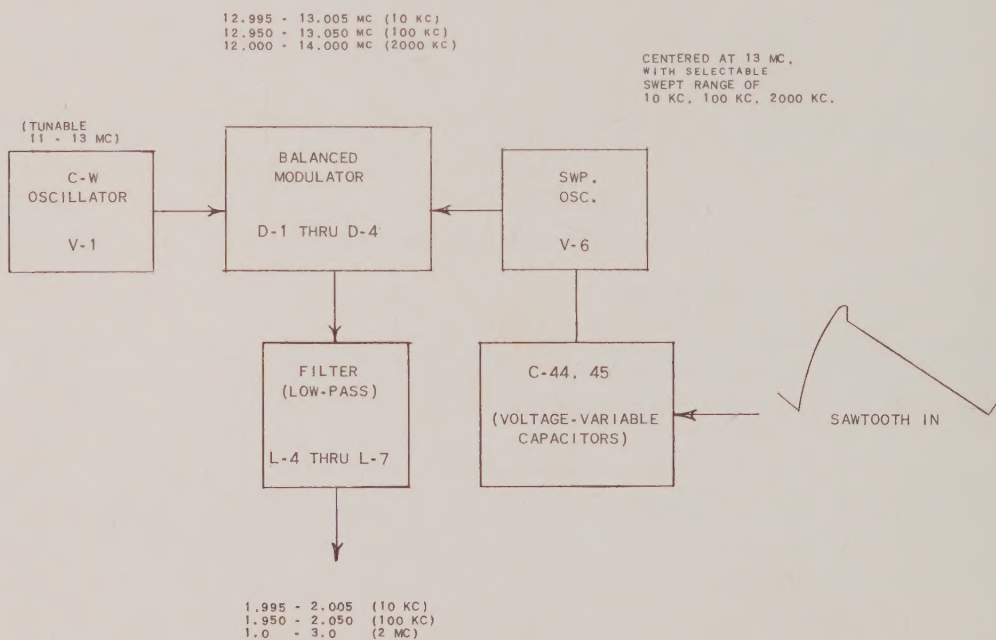


Fig. 3-2 Approximate and typical frequencies developed by heterodyne techniques employed in the P-130E.

The output stage of this amplifier (Q-2) is an emitter follower driving two outputs. (The purpose of these outputs is described in Sections 2-2 and 2-3.) Inductors L-8 and L-9 provide an adjustment for flatness of amplifier output. A low-voltage supply composed of rectifiers D-13 through D-16 furnishes power for Q-1 and Q-2.

SECTION IV, MAINTENANCE

4-1 INTRODUCTION.

Maintenance instructions furnished here supplement those contained in the manual for the basic rack unit. An inspection procedure which can be accomplished without removing the P-130E from the rack unit is described here, as well as an Adjustment and Alignment section, requiring the P-130E to be operated removed from the rack unit. This can be done by using a multiconductor cable fitted with con-

nectors compatible with those on the rack and plug-in unit (Extension Cable, Kay P/N 8085 @ \$14.95 ea., and a single conductor coaxial cable, Kay P/N 8084 @ \$4.95 ea.).

The Inspection Procedure for the basic rack unit should be accomplished before proceeding with this portion.

4.2 INSPECTION PROCEDURE.

A. Suggested Equipment.

- 1) Cathode-ray Oscilloscope, dc to 2 mc bandpass.
- 2) C-W Generator, 1 kc to 2 mc.
- 3) Detector (Fig. 4-3).

B. Check RF Output.

- 1) Connect equipment as in Fig. 4-1, and terminate the RF Output jack with a 68-ohm non-inductive resistor.
- 2) Set CRO X-axis controls for X-amplifier operation (internal sweep off).
- 3) A typical detected sweep pattern should appear on the CRO screen.
- 4) Set RF Level control fully clockwise and measure RF output, which should be 1 volt rms into 70 ohms.
- 5) Observe that RF Output Level meter reads approximately 1 volt.
- 6) Turn RF Level control fully counterclockwise and observe that r-f output drops approximately 6 db.

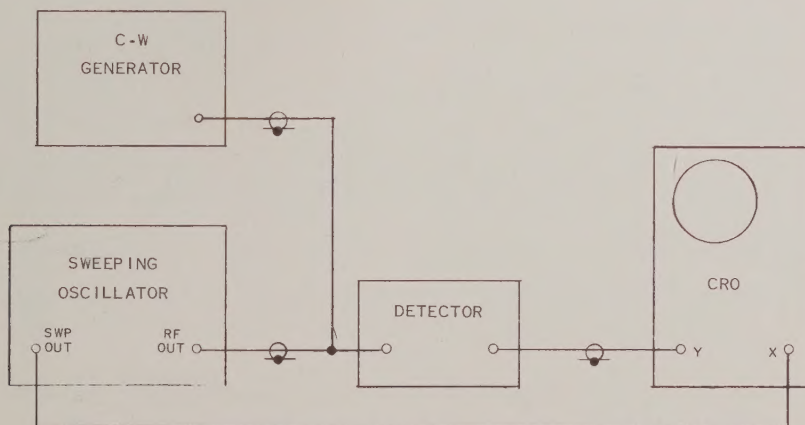


Fig. 4-1 Connection of equipment for performance inspection. The detector described in Fig. 4-3 may be used, or the built-in detector, if the Model Pi basic rack is used.

C. Check Sweep Width.

- 1) Set C-W generator to 2 mc.
 - a. Set Log-Lin switch to Lin position.
 - b. Set Sweep Width Kilocycles control to 2000-kc position.
 - c. Set Frequency Megacycles control (Model P-130E Plug-in) so that

zero beat appears at left end of trace (dial reading approx. 1 mc). The birdie-type variable marker should appear near right edge of trace, indicating a sweep width of 2 mc.

- 2) Set Sweep Width Kilocycles control to 100 kc.
 - a. Set C-W generator to 100 kc.
 - b. Set Frequency Megacycles control to position zero beat at left edge of trace (dial reading approx. 0.05 mc).
 - c. The birdie marker should appear near right edge of trace, indicating a sweep width of 100 kc.
- 3) Set Sweep Width Kilocycles control to 10 kc position.
 - a. Adjust Frequency Megacycles control to position zero beat at left edge of trace. (For this check, set Sweep repetition rate to approximately 5 cps.)
 - b. Set C-W generator to 10 kc.
 - c. Connect a 0.01ufd capacitor between the Det Out jack and equipment ground.
 - d. The marker should appear near right edge of trace, indicating a sweep width of 10 kc.
 - e. Remove the 0.01uf capacitor.
- 4) Set Frequency Megacycles control to 0 mc position.
 - a. With Sweep Width Kilocycles control set to 10 kc position, adjust Centering control to center zero beat.
 - b. Set C-W generator to 2 mc.
 - c. Set Frequency Megacycles control to 2 mc. A beat should appear near center of trace.
 - d. When Sweep Width Kilocycles control is switched to 100 kc and 2000 kc, the beat should remain near center of sweep.

D. Check Lin-Log Sweep.

- 1) Set Sweep Width Kilocycles control to 2000 kc.
 - a. Set Lin-Log switch to Log position.
 - b. Set Frequency Megacycles control to position zero beat at left edge of trace and 2-mc beat at right edge of sweep.
 - c. Set C-W generator for 200 kc and mark position of 200-kc marker on the sweep trace. Now set C-W generator to 20 kc and mark position of 20-kc marker on the sweep. Distance between the zero beat, 20-kc mark, 200-kc mark and 2-mc beat should be approximately the same (frequency spread is logarithmic). Fig. 4-2.

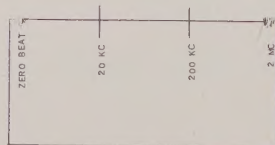


Fig. 4-2 Variable marker used to check logarithmic sweep.

4-3 ADJUSTMENT AND ALIGNMENT, Model P-130E Plug-in Unit.

A. Suggested Equipment.

- 1) Cathode-ray Oscilloscope, dc to 2 mc bandpass.
- 2) VTVM
- 3) C-W Generator(s) covering 1 kc to 2 mc.
- 4) RF Voltmeter
- 5) Extension Patch Cord to permit operation of the P-130E outside the cabinet.

B. Adjustment of DC BAL Pot (R-44).

- 1) Set Sweep Selector control to Man Swp position.
- 2) Connect the VTVM to Test Point 1 (C-58).
- 3) Adjust the pot, if necessary, to obtain 17 volts, which is the bias for voltage-variable capacitors C-44 and C-45.

C. Adjustment of Lin Adj Pot (R-43).

- 1) Connect VTVM to Test Point 2.
 - a. Set Manual Sweep control (on rack unit) so that spot on CRO screen is at a point corresponding to extreme left of trace observed for Line Lock sweep.
 - b. Adjust Lin Adj pot for a 28-v d-c reading.
 - c. Adjust Manual Sweep control so that spot on CRO screen corresponds with extreme right of trace. VTVM reading should be approximately 58 volts dc.
 - d. Similar voltage readings taken with Log-Lin switch set to Log position should be approximately 26 to 54 volts.

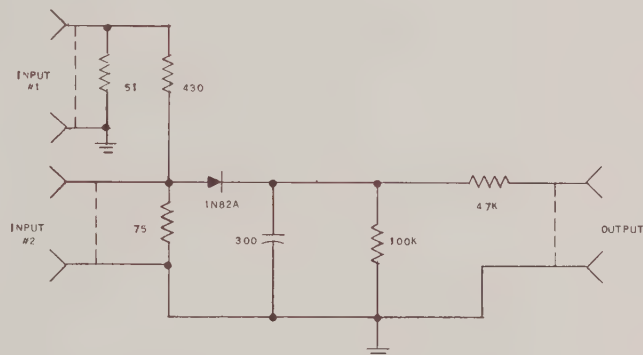


Fig. 4-3 Schematic for a typical detector, which should be assembled in a small metal case. Leads should be kept short, consistent with high-frequency wiring techniques.

D. Calibration of Frequency Megacycles Dial.

- 1) Set Frequency Megacycles dial to 0.
 - a. Set Centering control to mid-range.
 - b. Set Sweep Width switch to 10 kc.
 - c. Adjust C-1 (1.5-7uufd trimmer in plate circuit of V-1) so that zero beat appears in center of trace.
- 2) Set Frequency Megacycles dial to 2 mc.
 - a. Set c-w generator to 2 mc.
 - b. Adjust L-1 so that beat appears in center of trace.

- 3) Alternately repeat Steps 1.c and 2 until the dial tracks.
- 4) Set Sweep Width switch to 2000 kc.
 - a. Set Frequency Megacycles dial to 0.
 - b. Adjust L-3 so that zero beat is in approximate center of trace.

E. Sweep Width and Linearity Controls Check-out (S-1, R-43).

- 1) Set Sweep Width control for maximum sweep width.
 - a. Set Sweep Width Kilocycles switch to 2000 kc.
 - b. Set c-w generator to 2000 kc.
 - c. Set Frequency Megacycles dial so that zero beat is at left edge of trace.
 - d. The 2000-kc birdie should appear near right edge of trace (indicating proper sweep width). Mark position of birdie on CRO screen.
- 2) Set c-w generator to 1000 kc. The 1000-kc birdie should appear approximately midway between zero beat and position noted for 2000-kc birdie.

If 1000-kc birdie is off more than $\pm 5\%$ from trace center, readjust Lin Adj. pot. (See part C of 4-3.) (If it is necessary to make large adjustments of the Lin Adj pot, check diodes D-5, 6, 7 and 12, and associated circuitry.) Mark position of 1000-kc birdie.
- 3) Set c-w generator to 500 kc. The 500-kc birdie should appear midway between 1000-kc birdie and zero beat.
- 4) Set Sweep Width Kilocycles switch to 100 kc.
 - a. Set Frequency Megacycles dial so that zero beat is at left edge of trace.
 - b. Set c-w generator successively to 100, 75, 50 and 25 kc, marking the position of each birdie on CRO screen.
 - c. The 100-kc birdie should appear near right edge of trace, with equal spacing between positions marked for the other birdies.
- 5) Set Sweep Width Kilocycles switch to 10 kc (Rep rate approx. 5 cps).
 - a. Set zero beat to left edge of trace.
 - b. Set c-w generator to 10 kc, and note that 10-kc birdie appears near right edge of trace.
 - c. Move zero beat to center of trace and switch to 100 kc sweep width. Zero beat should remain in center of sweep as Sweep Width Kilocycles switch is switched between 10 and 100 kc positions. (If zero beat does not remain centered, a new value for R-47 may be selected.)

F. Logarithmic Sweep Check-out.

- 1) Set Log-Lin switch to Log position.
 - a. Set Sweep Width Kilocycles switch to 2000 kc.
 - b. Move zero beat to left edge of trace.

- c. Set c-w generator successively to 2 mc, 200 kc and 20 kc, marking position of each birdie on CRO screen. Observe that distance between birdies is approximately equal.
- 2) Set Sweep Width Kilocycles switch to 100 kc.
 - a. Move zero beat to left edge of trace.
 - b. Set c-w generator successively to 100 kc, 10 kc and 1 kc, marking position of each birdie on CRO screen.
 - c. Set Sweep Selector to obtain a 5-cps sweep rate, and observe that distance between birdies is approximately equal.
 - d. If distance between birdies (as marked on CRO screen in Steps 1 and 2) is not uniform, check V-7 and diodes D-8, 9 and 10, and associated circuitry.

G. Output Amplitude and Flatness Check-out.

- 1) Set Sweep Width Kilocycles switch to 2000 kc.
 - a. Tune for maximum flatness (± 0.5 db) as follows-

For low-frequency output, tune modulation transformers T-2 and T-3 (T-2 should be tuned so that output meter deviation is 0.5 db or less when center frequency is tuned between 0 - 2 mc).

For high-frequency output tune output transformer T-4.

For mid-frequency flatness tune filter coils L-5 and L-6.
- 2) Tune c-w oscillator transformer T-1 for output amplitude slightly more than 1 volt rms.
- 3) Set Sweep Width Kilocycles switch to 100 kc.
 - a. Vary Frequency Megacycles dial over its range. Output amplitude should remain constant (± 0.5 db). If amplitude is not constant, adjust L-8 and L-9 for maximum flatness. Output amplitude should remain constant as Sweep Width Kilocycles switch is switched between 2000- and 100-kc positions. If necessary, select a new value for R-37.
- 4) Switch to the 2000-kc range and readjust tuning slug in T-4, if necessary, to compensate for any change of flatness resulting from previous tuning of L-8 and L-9.
- 5) Set RF Level control fully clockwise. Set Sweep Selector switch to MAN.
 - a. Connect r-f voltmeter across RF Out jack (terminated with 68-ohm resistor).
 - b. Adjust Output Adj R-61 (int) for 1V rms as indicated by RF voltmeter.
 - c. Adjust Meter Adj R-62 (int) for 1 volt reading.
 - d. Disconnect r-f voltmeter.
 - e. Set RF Level control for minimum output (fully counterclockwise). Output meter on basic rack unit should indicate $0.5V \pm 5\%$. If not, select a new value for R-31.

H. Voltage Measurements.

Conditions-

- a. Sweep Selector set to Man.
- b. RF Level control set for max. output.
- c. Sweep Width switch set at 2000 kc.
- d. Measurements taken with VTVM.

TUBE DESIGNATION	SOCKET PIN NUMBERS									
	1	2	3	4	5	6	7	8	9	10 & 12
V-1 7586	NC	42	NC	-4.3*	NC	NC	NC	0	NC	FIL
V-2 6AH6	0	0	FIL	0	160	170	2.5	-	-	-
V-3 6AH6	0	0	0	FIL	160	150	1.9	-	-	-
V-6 7586	NC	23.5	NC	-1.25*	NC	NC	NC	0	NC	FIL
V-7 12AT7	250	108	110	0	0	250	102	108	FIL	-
TRANSISTOR	Base Collector Emitter									
Q-1	1.4V		15V		0.8V					
Q-2	14.3V		2.2V		14.6V					
* MEASURED WITH A 47-K ISOLATION RESISTOR IN SERIES WITH VTVM PROBE.										

I. Trouble-Shooting Suggestions.

Before proceeding with the trouble-shooting suggestions listed here, check those furnished in the manual for the rack unit.

Figures 4-4 and 4-5 show location of major components.

SYMPTOM	CIRCUITS TO BE CHECKED
No output, or low output.	V-1, 2, 3, 6 and 7, plus Q-1 and Q-2; also +250V power supply and +22V power supply.
Distorted output.	Q-1, Q-2. Modulator diodes D-1 thru D-4.
Poor linearity.	V-7. Check adjustment of Lin Adj and DC Bal pots. Diodes D-5, 6 and 12.
Poor log sweep.	V-7. Diodes D-8, 9, and 10.
Insufficient sweep.	V-7. Low sawtooth voltage from basic rack unit. Check adjustment of Lin Adj and Bal pots; Voltage-variable capacitors C-44, 45.
Incorrect dial calibration.	Check adjustment of oscillator V-6. Check adjustment of Lin Adj and DC Bal pots. Diodes D-7, 11.
Incorrect RF output meter readings.	Pot R-62, diode D-17.

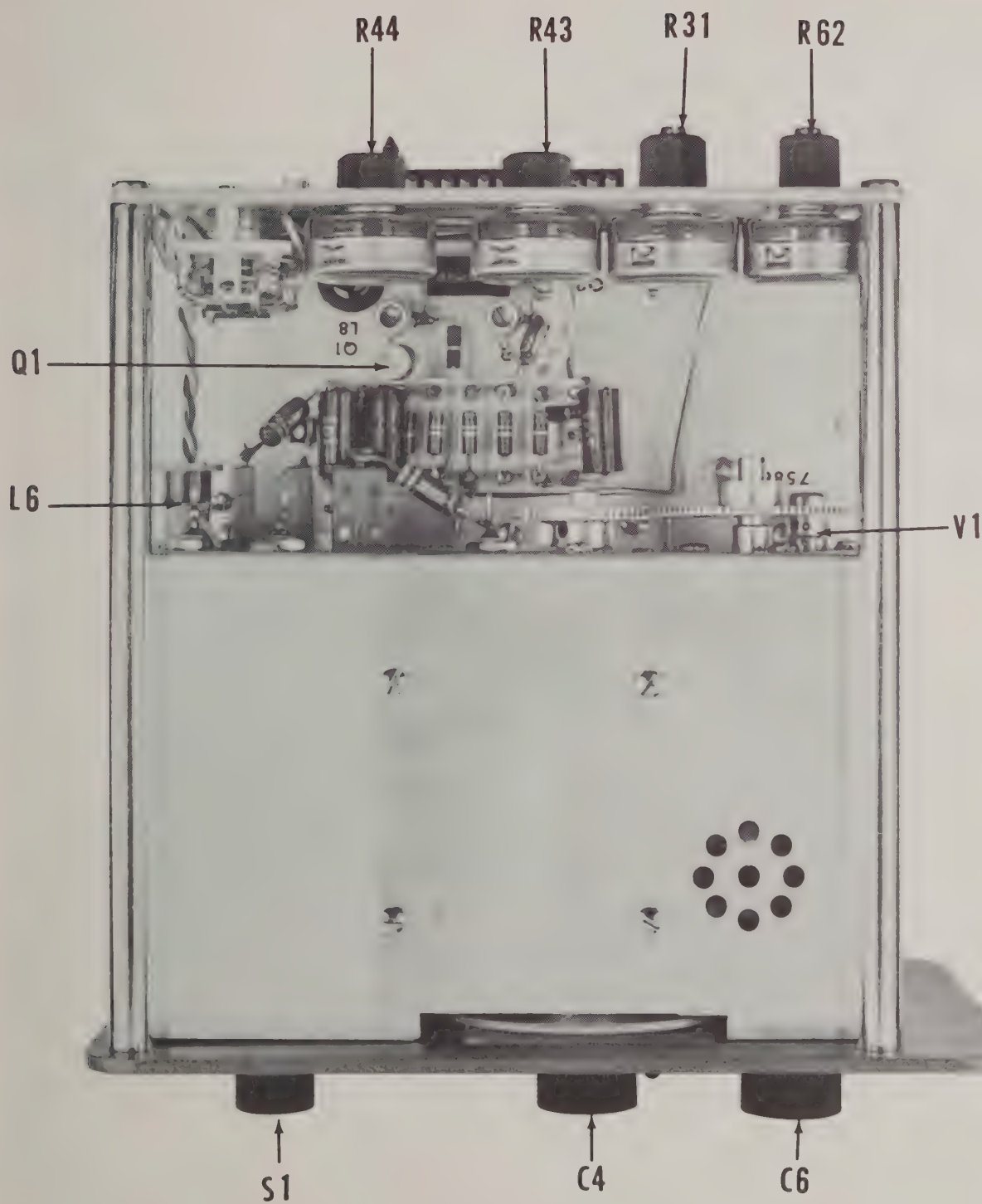


Fig. 4-4 Top view of chassis showing major components.

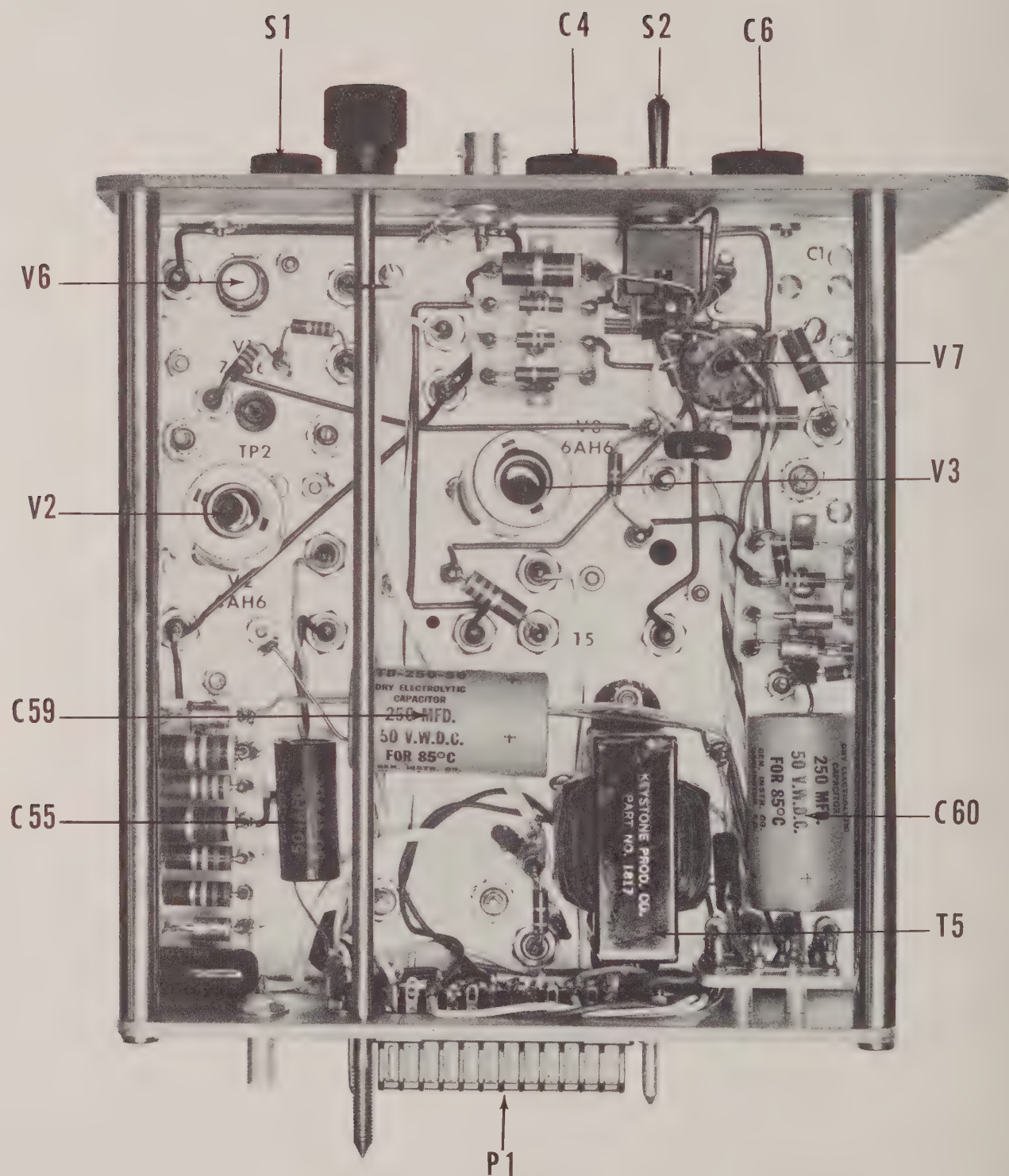


Fig. 4-5 Bottom view of chassis showing major components.

SECTION V, LISTING OF REPLACEABLE PARTS

5-1 INTRODUCTION.

To maintain new-instrument performance when repairs are made, use only exact replacement parts, which are obtainable from Kay Electric Company. Reference the instrument type, serial number and circuit symbol number when ordering replacement parts.

5-2 LISTING OF REPLACEABLE PARTS, P-130E Plug-in Head.

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MFR. & MFR. DESIGNATION	UNIT SELLING PRICE
CAPACITORS: (All capacitance in uuf, 500 volts, unless otherwise indicated.)				
C1	1.5-7, ceramic trimmer	6358-4	Erie 503000 COPO 1QR	\$0.70
C2	10, silver mica	6359-53	Elmenco DM15-100	.40
C3	100 " "	6359-46	" DM15-101	.40
C4	7-45, variable, air	7923	Hammerlund RMC 50-M	11.80
C5	3, silver mica	6359-51	Elmenco DM15-030	.40
C6	3-15, variable, air	1991	Hammarlund HF15	2.05
C7	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C8	91, silver mica	6359-68	Elmenco DM15-910	.40
C9	Not used			
C10	300, silver mica	6359-64	" DM15-301	.45
C11	1000, ceramic, GP	6361-25	Erie 33100 X5U0 102K	.15
C12 & C13	4000, ceramic, feed thru	6356-5	" X5V2443-4000GMV	.85
C14	Not used			
C15	4000, ceramic feed thru	6356-5	" X5V2443-4000GMV	.85
C16	500, 300V, silver mica	6359-66	Elmenco DM15-501	.55
C17	1000, ceramic, GP	6361-25	Erie 331000X5U0 102k	.15
C18	0.01uf, 100V, Mylar-paper	6899-12	Elmenco 10P-1-103	.45
C19 & C20	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C21	500, 300V, silver mica	6359-66	Elmenco DM15-501	.55
C22	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C23	1000, ceramic, GP	6361-25	" 331000 X5U0 102K	.15
C24	0.01uf, 100V, Mylar-paper	6899-12	Elmenco 10P-1-103	.45
C25 & C26	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C27 thru C29	820, silver mica	6359-31	Cornell-Dubilier 5R5T82	.35
C30 thru C32	25uf, 25V, electrolytic	6355-4	Astron MM-25-25	.55
C33	15, silver mica	6359-55	Elmenco DM15-150	.40
C34	25uf, 25V, electrolytic	6355-4	Astron MM-25-25	.55
C35	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C36	20, silver mica	6359-57	Elmenco DM15-200	.40
C37	300, silver mica	6359-64	" DM15-301	.45
C38	91, silver mica	6359-68	" DM15-910	.40
C39	30, silver mica	6359-58	" DM15-300	.40
C40	1000, ceramic, GP	6361-25	Erie 331000 X5U0 102K	.15
C41	4000, ceramic feed thru	6356-5	" X5V2443-4000GMV	.85
C42	10, silver mica	6359-53	Elmenco DM15-100	.40
C43	390, silver mica	6359-65	" DM15-391	.50
C44 & C45	33, variable	7660	P.S.I. V33E	5.05
C46	0.001uf, 600V, Mylar-paper	6899-10	Elmenco 6DP-1-102	.35
C47	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C48	20, silver mica	6359-57	Elmenco DM15-200	.40
C49	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C50	0.22uf, 50V, Mylar	6411-1	Goodall 601PE	.55
C51	500, ceramic feed thru	6356-6	Erie X5V2443-500GMV	.75
C52	1000, ceramic, GP	6361-25	" 331000 X5U0 102K	.15
C53 & C54	4000, ceramic feed thru	6356-5	" X5V2443-4000GMV	.85
C55	50uf, 50V, electrolytic	6355-60	Astron MM50-50	.75
C56 thru C58	4000, ceramic feed thru	6356-5	Erie X5V2443-4000GMV	.85
C59 & C60	250uf, 50V, electrolytic	6355-65	Mallory TC50025	1.75
C61	0.005uf, 100V, Mylar-paper	6899-14	Elmenco 10P-1-502	.45
C62	250, silver mica	6359-75	" DM-15-251	.45
D1 thru D4	Diode, germanium 1N126A (matched set of 4)	6357-19M	Erie 1801ED 1N126A	3.70
D5 & D6	Diode, silicon 1N538	6357-14	General Electric 1N538	1.60
D7	" Zener, 1N3036	6357-37	Motorola 1N3036	5.25

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MFR. & MFR. DESIGNATION	UNIT SELLING PRICE
D8 thru D10	Factory selected			
D11	Diode, Zener 3/4 M 91 Z10	6357-41	Motorola 3/4 M 91Z10	\$4.60
D12	" silicon 1N538	6357-14	General Electric 1N538	1.60
D13 thru D16	" " F6	6357-3	Sarkes Tarzian F6	.80
D17	Not used			
D18	Diode, germanium 1N294	6357-18	Erie 1801ED 1N294	.90
J1	Connector, female, UG625/U	451	Dage UG625/U	.70
J2	Connector, female, UG1050/U	7661	L.P.C. RG1050/U	.90
COILS:				
L1	Slug-tuned, 3.5-7uh	6394-9	Cambridge #X2060-2	1.60
L2	" " special	L2/7652H	Kay Electric Co.	1.00
L3	" " 3.5-7uh	6394-9	Cambridge #X2060-2	1.60
L4	Fixed, special	L4/7652	Kay Electric Co.	.50
L5	Slug-tuned, special	L5/7652H	" " "	1.00
L6	" " "	L6/7652H	" " "	1.00
L7	Fixed, special	L7/7652H	" " "	.50
L8 & L9	Slug-tuned 61-122uh	6394-16	Cambridge #2060-7	2.20
L10 thru L13	Filament choke .8uh	6394-3	Kay Electric Co.	.20
P1	Connector, male, 26-159-24	7570	Amphenol 26-159-24	1.95
RESISTORS: (Unless otherwise specified, all resistors are fixed composition, 1/2 watt, 10% tolerance.)				
R1	56K, 1 watt	5631-G	Allen-Bradley GB5631	.15
R2	68K, 1 watt	6831-G	" " GB6831	.15
R3	33K, 1 watt	3331-G	" " GB3331	.15
R4	10K	1031-E	" " EB1031	.10
R5 & R6	4.7K, 2 watts	4721-H	" " HB4721	.30
R7	2.2K	2221-E	" " EB2221	.10
R8	150	1511-E	" " EB1511	.10
R9	100	1011-E	" " EB1011	.10
R10	4.7K, 1 watt	4721-G	" " GB4721	.15
R11	2.7K	2721-E	" " EB2721	.10
R12 & R13	4.7K, 2 watts	4721-H	" " HB4721	.30
R14	100	1011-E	" " EB1011	.10
R15	150	1511-E	" " EB1511	.10
R16	33K, 1 watt	3331-G	" " GB3331	.15
R17	Not used			
R18	15K	1531-E	" " EB1531	.10
R19	1K	1021-E	" " EB1021	.10
R20	100	1011-E	" " EB1011	.10
R21	150	1511-E	" " EB1511	.10
R22	1.8K	1821-E	" " EB1821	.10
R23	10K	1031-E	" " EB1031	.10
R24	15K	1531-E	" " EB1531	.10
R25	68K	6831-E	" " EB6831	.10
R26	270	2711-E	" " EB2711	.10
R27	68	6801-E	" " EB6801	.10
R28 & R29	510, 1 watt, 5% tolerance	5115-G	" " GB5115	.30
R30	330	3311-E	" " EB3311	.10
R31	1K, 2 watt pot, variable	139	" " JA2N048S102UE	2.00
R32	12K	1231-E	" " EB1231	.10
R33	Not used			
R34	68K, 1 watt	6831-G	" " GB6831	.15
R35 & R36	33K	3331-E	" " EB3331	.10
R37	Factory selected			
R38	10K	1031-E	" " EB1031	.10
R39 & R40	33K	3331-E	" " EB3331	.10
R41	47K	4731-E	" " EB4731	.10
R42	100K	1041-E	" " EB1041	.10
R43 & R44	10K, 2 watt pot, variable	108	" " JA2N048S103UE	2.00
R45	47K, 2 watts	4731-H	" " HB4731	.30
R46	3.9K	3921-E	" " EB3921	.10
R47	33K	3331-E	" " EB3331	.10
R48	27K	2721-E	" " EB2731	.10
R49	390K	3941-E	" " EB3941	.10

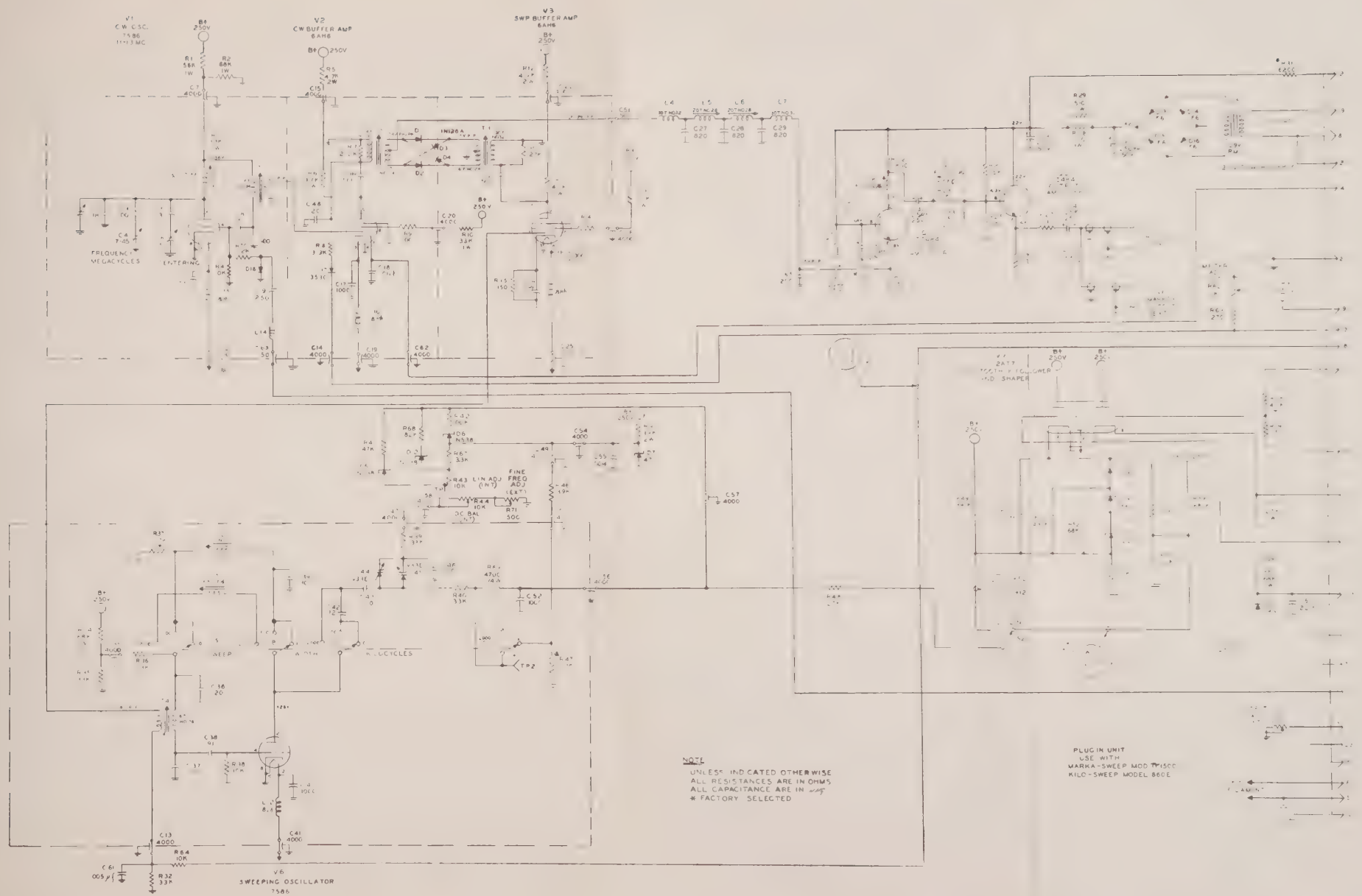


Fig. 5-1, P-130E Schematic, D-7652-P.

ADDENDUM #862-7652N

In order to keep this instruction book up-to-date, note the changes given below on the parts list. An up-to-date schematic is included in this manual.

Correct the Parts List to read as follows:

<u>Dwg.</u> <u>Symbol No.</u>	<u>Description</u>	<u>Kay</u> <u>Part No.</u>	<u>Dwg.</u> <u>Symbol No.</u>	<u>Description</u>	<u>Kay</u> <u>Part No.</u>
C9	250, silver mica	6359-75	R8	3.3 K	3321-E
C14	4000, feed thru	6356-5	R10	33 K, 1 watt	3331-G
C62	4000, feed thru	6356-5	R31	Factory select	
C63	50, silver mica	6359-60	R32	33 K	3331-E
C64	1.5 to 7 uuf trimmer	6358-4	R47	Factory select	
C65	200, silver mica	6359-13	R61	200, variable	95
C2	18, silver mica	6359-56	R62	1 K, variable	139
C42	12, silver mica	6359-54	R63	270	2711-E
			R71	500, variable	100
			R45	39 K, 2 watts	3931-H
L14	Choke, 50 uh	6394-4	R27	51Ω	5101-E
			R20	Factory select	

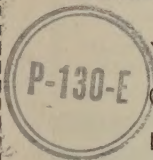
DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.	MFR. & MFR. DESIGNATION	UNIT SELLING PRICE
R50	3.3M	3351-E	Allen-Bradley EB3351	\$0.10
R51	430K, 5%	4345-E	" " EB4345	.25
R52	68K	6831-E	" " EB6831	.10
R53	10K	1031-E	" " EB1031	.10
R54	22K	2231-E	" " EB2231	.10
R55	12K	1231-E	" " EB1231	.10
R56	680K	6841-E	" " EB6841	.10
R57	27K, 1 watt	2731-G	" " GB2731	.15
R58	Factory selected			
R59	1.5M	1551-E	" " EB1551	.10
R60	68K, 1 watt	6831-G	" " GB6831	.15
R61	10K	1031-E	" " EB1031	.10
R62	25K, 2 watt pot, variable	113	" " JA2N048S253UE	2.00
R63	Factory selected			
R64	10K	1031-E	" " EB1031	.10
R65	Not used			
R66	2.7K	2721-E	" " EB2721	.10
R67	3.3K	3321-E	" " EB3321	.10
R68	82K	8231-E	" " EB8231	.10
R69	4.7K, $\frac{1}{2}$ watt	4721-C	" " CB4721	.15
R70	22K, $\frac{1}{2}$ watt	2231-C	" " CB2231	.15
S1	Switch, rotary, 2 wafer, 3 pos.	7572A	Kay Electric Co.	3.75
S2	" toggle, DPDT	254-A	AH & H 81027-CE	1.50
T1	Transformer, slug-tuned	T1/7652H	Kay Electric Co.	1.25
T2	" " "	T2/7652H	" " "	1.25
T3	" " "	T3/7652H	" " "	1.25
T4	" " "	T4/7652H	" " "	1.25
T5	" power	6405	Keystone #1817	8.60
TP2	Test jack	7581	Alden #9462	.10
Q1 & Q2	Transistor T1 484	K-130	Texas T1 484	5.35
V1	Nuistor 7586	7586	RCA 7586	3.55
V2 & V3	Tube, electron 6AH6	6AH6		1.85
V4 & V5	Not used			
V6	Nuistor 7586	7586	RCA 7586	3.55
V7	Tube, electron 12AT7	12AT7		1.50

June, 1964

ADDENDUM

Units having serial numbers of 27524 or higher contain an additional 500-ohm control labelled FINE FREQ ADJ and designated R-71. This control, connected between the D-C Bal control (R-44) and ground, provides a means of making small changes in center frequency when the instrument is being operated over narrow sweep widths.

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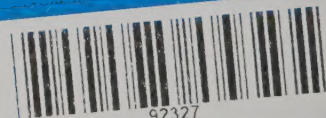
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